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NOTES AND EXTRACTS.

TORNADO IN INDIAN TERRITORY.

Mr. C. M. Strong, Section Director, Oklahoma, Okla., sends data relative to a tornado on April 24. The tornado was first heard of at Choteau, Ind. T. It began in the Verdigris River bottoms, and extended northeast to the northern part of the Cherokee Nation country. Destruction is reported from Choteau, Fairland, and Clearwater. Large hailstones and a deluge of rain accompanied the tornado in the Cherokee Nation. A general electric storm prevailed all day, followed by a heavy downfall of rain and then by the tornado.

The postmaster at Ketchum reports that the storm passed through that place about 12 o'clock (probably central time), leaving the river bottom and striking the hills and then the prairie beyond. The storm was visible for five or ten minutes as it passed in a northeast direction, a little east of Ketchum.

It moved up the Grand River Valley, reaching Cleora, Ind. T., 7 miles south of Afton, on Sunday, April 24, at 12:25 p. m.

The postmaster at Afton thinks possibly there were two storms traveling parallel with each other 6 or 7 miles apart, each of them destroying everything it came in contact with when it descended to the ground, and each path of destruction ranging from 150 to 300 feet wide. As a rule houses that were destroyed were carried and scattered to the northeast. The storm was pretty generally over in twenty minutes, covering a territory measuring 6 or 7 miles east and west and 30 miles north and south.

The postmaster at Fairland says: "Storm came at 12:35 p. m., after a heavy rain of about thirty minutes with some hail. It was noticed some half hour before, but thought it was going west of us. It came from the south and lasted about one minute. The path of the destructive wind was about 400 yards wide; débris was thrown in all directions. Some observed the funnel-shaped cloud, but I did not. The cloud lifted after leaving here and no damage was reported north of us."

It was last observed at Fairland. The funnel cloud was noted, but the first intimation of the approach of the tornado was a loud, roaring noise. The general direction of the path was north and east, and the width of the path of destruction about one-fourth of a mile.

From Choteau to Fairland the track covers about 60 miles in length. The storm is said to have been the worst that has been known in the Indian Territory.

TORNADO AT GRAND RAPIDS, MICH.

The following details of a tornado at Grand Rapids, Mich., on March 24, are obtained from the report of Mr. C. F. Schneider, Section Director at that place. The tornado moved in a due northeasterly direction across the southeastern portion of the city, over a path about 2 miles long and from 25 to 200 feet in width. Nothing could be learned regarding the appearance of the sky or the atmosphere during the passage of the tornado, because it had been a wet, stormy evening, and almost everyone was indoors.

At the Weather Bureau office, distant about 2½ miles from the nearest point of the storm's path, the records show a steadily increasing southeasterly wind from about 8 p. m. (seventy-fifth meridian time), until 10 p. m., when it had reached a velocity of 32 miles. At 10:05 p. m., when the wind had suddenly shifted to the southwest, it attained a maximum velocity of 52 miles. It then decreased with equal sudden-

ness, falling to 16 miles per hour by 10:30 p. m. Rain, accompanying a heavy thunderstorm, began at 9:10 p. m., and during the very high wind came down in a deluge, 0.06 of an inch falling in about two minutes. Although no hail fell at the Weather Bureau office, large, opaque hailstones, about half an inch in diameter, fell in the storm track immediately after the wind rush ceased.

Damage by the tornado amounted to about $15,000 and several persons were injured.

The tornado occurred at 10:05 p. m., which was the time of maximum wind velocity at the Weather Bureau station.

LOCAL COOPERATION IN FROST PREVENTION.

Mr. Richard H. Sullivan, Observer, in charge of the Weather Bureau station at Grand Junction, Colo., reports the result of his efforts to raise a healthy sentiment in that locality in favor of employing concerted artificial methods for the prevention of damage by frost. Having on all occasions advocated the use of smudges on a generous scale, he was finally able to bring about a practical illustration of the value of his idea of combined effort.

On April 21, a frost warning was issued by the district center through the local office, and this was in turn given the widest possible distribution. Consultation with the officers of the Fruit Growers' Association and other citizens resulted in a meeting at the office of the Daily Sentinel, where ways and means were discussed, the mayor of the city extending the influence of his office toward enlisting the efforts of the residents to assist in smudging the whole valley if necessary. Therefore, on account of the warning and also the comparatively low temperature prevailing, the mayor issued a proclamation calling on all citizens to prepare smudge piles. The local office was designated as the central point for information as to the fall in temperature during the ensuing night, and Messrs. Adams and Moore agreed to assist in the work of urging all fruit growers to make preparations. Arrangements were made with Mr. G. W. Peugh, Manager of the Colorado Telephone Company's exchange in this city, for extra night service. Mr. Peugh detailed two operators for the work, with instructions to call the observer should dangerous temperatures be reported before the agreed hour of 3 a. m., local time, the following morning. Under the mayor's instructions, the city employees under the street commissioner placed wagonloads of manure and rubbish in all the open lots of the city, and the residents very generally responded to the request of the mayor by placing smudge piles in their back yards. By midnight the work of placing 1000 large smudge piles in the city limits was completed. It was agreed that the time for lighting was to be determined after consultation with the orchardists by telephone at or before the appointed hour, all connections to be made with the line running to the Weather Bureau office, so that each individual could hear observed temperatures and discuss ways and means with his neighbors up and down the line. A continued fall in the temperature resulted in the decision to start the general smudge at 5 a. m., local time, April 22. By 5:30 a. m. the whole valley was covered with a sheet of dense smoke 50 to 75 feet deep, 8 to 10 miles wide, and about 40 miles long. The winds being light, the smoke seemed to settle well over everything, drifting slowly over the valley with changing currents, similar to a dense fog, and the first systematic smudge ever attempted in the valley was successfully in operation. A light frost was discovered, by careful examination, under tufts of alfalfa along the city ditches, but none on the walks or in the open. No damage resulted, due, many orchardists affirm, to the thorough manner in which smudging was carried out. By 10 a. m., local time, the smoke had almost entirely disappeared. On the night of the 23d–24th, preparations were made for a second combined effort, but the night passed without its being necessary to light the fires. At 3 a. m. of the 25th, local time, the Weather Bureau office was again opened, and temperature reports were received and compared. Toward daylight, the temperatures had fallen to 37° in the vicinity of Grand Junction and to 33° farther northwest. Smudge fires were started over a large area, and but slight damage was reported. At 4 a. m. of the 30th, the office was again opened for business, but comparison of temperatures showed that smudging was not necessary. The Chamber of Commerce united in an expression of appreciation of Mr. Sullivan's attention to the interests of the community and of gratification at the good results of the work.

THE TRIENNIAL MEETING, APRIL, 1904, OF THE GERMAN METEOROLOGICAL SOCIETY.

There was a considerable attendance at the triennial meeting of the German Meteorological Society, held at the Institut für Meereskunde in Berlin during Easter week, under the presidency of Professor von Bezold. Numerous papers were read and discussed, those on April 7 and 9 being mainly meteorological, and those on April 8 electrical and magnetical, the one which occasioned the most animated discussion being communicated by Professor Holdefleiss, Halle, "Ueber die meteorologischen Ursachen des Auswinterns des Getreides." On the afternoon of April 7 the members were conducted over the Meteorological Institute in the Schinkelplatz; that of April 8 was devoted to the Physical Observatory at Potsdam; that of April 9 to the meteorological and military balloon and kite flying establishments at Tegel, and the evening to the Geographical Society's meeting; and Sunday evening to the Astronomical Observatory at Treptow. At Tegel, the Luftschiff military section charged a balloon of 600 cubic meters within three minutes; within fifteen minutes it had been attached to its car, and with two officers aboard had disappeared beyond the clouds. The military authorities also carried out wireless telegraph experiments by means of kites. Dr. Assmann, in charge of the meteorological station, had observations taken at a considerable elevation by means of a kite, and also dispatched a small rubber free balloon with a set of instruments attached.—*From Nature, April 21, 1904, p. 587, vol. 69.*

THE METEOROLOGY OF THE UPPER AIR.

The international commission for scientific balloon ascensions has, as is well known, published during the past year in great detail the results of work with balloons and kites and on high mountain stations during the years 1901, 1902, and 1903. It proposes to continue this publication, but, according to a recent circular, there will be added thereto an appendix or series of papers, published at irregular intervals, containing special investigations on the results of the international balloon ascensions. It seems that the great mass of data now rapidly accumulating is likely to frighten individual students from undertaking the necessarily tedious investigations suggested thereby, and that many valuable results will remain hidden from the world unless the International Committee promptly supervises the discussion and publication of such results as can be attained. This will also be a valuable means of improving future work. The development of meteorology depends more upon the prompt discussion and publication of data obtained from the upper atmosphere than upon any other class of work that is now being carried on by observers as such. On the other hand, a still more important class of work is that which relates to the improvement of the mathematical methods of treating the mechanical and physical theories of the motions of the atmosphere, and this subject will undoubtedly be fully provided for by the international commission. Subscriptions for the proposed appendix to the international observations at great altitudes will be received by the firm of H. Trübner, Strassburg.

THE METEOROLOGY OF JAMAICA.

The Institute of Jamaica has just published a handy pamphlet by Maxwell Hall, esq., on the meteorology of that island. To this subject Mr. Hall has given especial attention during his long and active life, and is properly recognized as our highest authority. Besides describing the instruments, the stations, and the laws of storms for the West Indian cyclones, he also gives a list of the more important articles that have been published in the monthly weather reports compiled by him for the Weather Service of Jamaica since 1880. We quote the following from among the numerous interesting items relative to clouds:

1. *Cirrus.*—Cirrus clouds are often seen in the morning about sunrise during the summer and autumn months, but they rapidly disappear as the temperature of the day increases. Under these circumstances they are fine-weather clouds, and it is only when they increase in extent and develop into cirro-stratus that they can be connected with bad weather. There is a well-marked upper current from the east-northeast during the